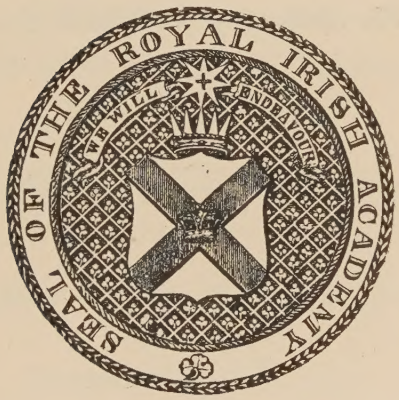
THE

TRANSACTIONS

OF THE

ROYAL IRISH ACADEMY.

VOLUME XXXI.



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VOLUME XXXI.—PART I.

ON DEEP-SEA CRUSTACEA FROM THE SOUTH WEST OF IRELAND.

BY W. T. CALMAN, B.Sc., University College, Dundee.

(PLATES I. AND II.)

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TRANSACTIONS

OF THE

ROYAL IRISH ACADEMY.

I.

ON DEEP-SEA CRUSTACEA FROM THE SOUTH WEST OF IRELAND.

By W. T. CALMAN, B.Sc., University College, Dundee.

(Plates I. and II.)

[FORWARDED BY PROFESSOR D'ARCY W. THOMPSON, COMMUNICATED BY DR. E. P. WRIGHT.]

(Read March 16, 1896.)

The following Paper is based on an examination of the Podophthalmate Crustacea obtained during the various deep-sea dredging expeditions of the Royal Irish Academy off the south-west coast of Ireland in the years 1885–88, together with a part of those dredged by the Rev. Mr. Green in the "Flying Fox" expedition of 1889. These collections are now in the Museum of Science and Art, Dublin, and I have to thank Dr. Scharff, the keeper of the Natural History Department, for the opportunity of examining them, and for permission to partially dissect the unique specimens of the two new species. The investigation of these has been carried out, and this Paper prepared, under the guidance of Prof. D'Arcy W. Thompson, in the Zoological Laboratory of University College, Dundee.

Two Papers have been published dealing with the Crustacea of the region under consideration. In 1889, Mr. R. I. Pocock* described those

* Ann. & Mag. Nat. Hist. (6), iv., p. 425.

obtained by Mr. Green on the "Flying Fox" Expedition. Part of Mr. Green's collections, however, were deposited in the Dublin Museum without having passed through Mr. Pocock's hands; and from an examination of these we have been able to add two new British species to his list. In the following year Mr. G. C. Bourne† published the results of a trawling cruise in H. M. S. "Research," and added several species to the list given by Mr. Pocock. A number of species are also recorded from this region by the Rev. Dr. Norman in his Revision of the British Schizopoda.‡ Combining the lists given in these Papers, we find that the following species are recorded as living in deep water (say from fifty fathoms) off the south-west coast of Ireland :—

Xantho tuberculata, Couch, . .	400	fms.,	Bourne.
Portunus tuberculatus, Roux, .	70	,,	,,
Bathynectes superba (Costa), .	400	,,	,,
Atelecyclus septemdentatus (Mont.),	70–400	,,	,,
**Lispognathus thomsoni* (Norman), .	250–400	,,	Pocock & Bourne.
Hyas coarctatus, Leach, . .	250	,,	Pocock.
**Scyramathia carpenteri* (Norman),	110–400	,,	Pocock & Bourne.
Eurynome aspera (Pennant), .	315	,,	Pocock.
**Ebalia nux*, Norman, . . .	315–400	,,	Pocock & Bourne.
**Eupagurus bernhardus* (L.), . .	55	,,	Pocock.
**Eupagurus pubescens* (Kröyer), .	200	,,	,,
**Eupagurus excavatus*, Herbst, .	70–110	,,	Pocock & Bourne.
**Eupagurus carneus*, Pocock, .	110–400	,,	,, ,,
**Parapagurus pilosimanus*, Smith, .	315–1000	,,	,, ,,
**Munida rugosa* (Fabr.), . .	250–315	,,	Pocock.
**Pontophilus spinosus*, Leach, .	400	,,	Bourne.
**Pandalus montagui*, Leach, . .	55–315	,,	Pocock.
**Lophogaster typicus*, M. Sars, .	90–1630	,,	Norman.
Erythrops serrata, G. O. Sars, .	80–100	,,	,,

† Journ. Mar. Biol. Assoc., N.S., I., p. 306.
‡ Ann. & Mag. Nat. Hist. (6), IX., X., 1892.

We have marked with an asterisk those species which have come under our observation from the region indicated, and we have now to record the occurrence of the following forms:—

Eupagurus variabilis, A. M.-E. & Bouv.,	—
Uroptychus rubro-vittatus (A. M.-E.),	750 fms.
Pandalus leptorhynchus, Sars,	214 ,,
Nematocarcinus exilis (Sp. Bate),	750 ,,
Bresilia atlantica, gen. et sp. nov.,	750 ,,
Solenocera siphonocerus (Philippi),	345 ,,
Sergestes, sp.,	1020 ,,
Eucopia australis, Dana,	1020 ,,
Nematodactylus boopis, gen. et sp. nov.,	1020 ,,

None of these species have yet been recorded from British waters. The three last-named coming from 1020 fms. are just outside the British area, as defined by Norman,* and cannot yet claim admission as regular members of our fauna. The following are already known as British:—

Xantho incisus, Leach,	70–80 fms.
Gonoplax rhomboides (L.),	70–80 ,,
Macropodia longirostris (Fabr.),	70–80 ,,
Inachus dorynchus, Leach,	70–80 ,,
Ebalia tuberosa (Penn.),	80 ,,
Ebalia cranchii, Leach,	50 ,,
Eupagurus prideaux (Leach),	70–80 ,,
Anapagurus lævis (Thomps.),	50–80 ,,
Galathea dispersa (Sp. Bate),	70–100 ,,
Crangon allmanni, Kinah.,	50–80 ,,
Cheraphilus nanus (Kröy.),	90 ,,
Egeon sculptus (Bell),	300 ,,
Hippolyte spinus, Sow.,	50 ,,

* Ann. & Mag. Nat. Hist. (6), v., p. 345, 1890.

Sub-Order—MACRURA.

Tribe—**ANOMALA.**

Family—PAGURIDÆ.

Eupagurus variabilis, A. M.-E. & Bouv.

Eupagurus variabilis, A. MILNE-EDWARDS et E. L. BOUVIER. "Observations préliminaires sur les Paguriens recuellis par les expeditions du *Travailleur* et du *Talisman,*" Ann. Sc. Nat. (7) Zool., xiii., p. 217–218, 1892.

As pointed out by Professors Milne-Edwards and Bouvier in their preliminary account, this species resembles *Eupagurus excavatus* (Hbst.), differing from it, however, in the following characters. The abdomen of the male bears only three unpaired swimmerets instead of four as in *Eu. excavatus,* the appendage corresponding to the second abdominal segment being absent. The central and lateral ridges on the right chela, which are so marked in *Eu. excavatus,* are here almost obsolete, the areas between the ridges are hardly at all concave, and the whole surface of the chela is covered with granules, which, on the inner edge, and especially on the carpus, become spiniform. Professor Bouvier, who kindly confirmed, from a photograph sent to him, our identification of the Irish specimens, remarks that they belong to the most typical form of this very variable species, approaching very closely in general aspect to *Eupagurus excavatus.*

Length of body in largest specimen, 40 mm. Total length (chela extended), 70 mm.

"Flying Fox" Exp., 1889.

Family—GALATHEIDÆ.

Uroptychus rubro-vittatus (A. Milne-Edwards).

Diptychus rubro-vittatus, A. MILNE-EDWARDS. "Rapp. sur la faune sous-marine," Arch. des Miss. Scient. et Litt., 3e Serie, IX., p. 40–41, 1882.

Diptychus rubro-vittatus, A. MILNE-EDWARDS. "Receuil des Figures des Crustacés noveaux ou peu connus," Ire Livraison, 1883.

" " J. BONNIER. "Les Galatheidæ des côtes de France," Bull. Scient. de France et de Belgique, XIX., p. 170, pl. xiv., 1888.

" " MILNE-EDWARDS & BOUVIER. "Crust. Dec. des campagnes du yacht *Hirondelle*," 1re Partie, pp. 88–90, pl. vi., 1–12, 1894.

Uroptychus rubro-vittatus (A. M.-E.), STEBBING, "Hist. Crustacea," p. 178, 1893.

On comparing our specimens (which are all females) with the very full description and figures given by Bonnier (*l. c.*), certain differences are apparent: his figures show the eyes as very much smaller, the rostrum shorter and less acute, the whole carapace shorter and broader than in our specimens; and it is to be noted that all these points in Bonnier's characterization are among those mentioned in Milne-Edwards' original diagnosis as distinguishing the species from its West-Indian congener, *U. nitidus* (A. M.-E.). Further, the lateral edges of the carapace, which in Bonnier's specimens were serrated in front and smooth behind, are in ours quite smooth in front and only slightly granulated behind. Milne-Edwards' original figures (*l. c.*, 1883) agree generally with Bonnier's, but differ from them and from our specimens in representing the chelæ as sparsely covered with long fine hairs instead of being quite glabrous. On the other hand, the figures of the male given by Milne-Edwards and Bouvier (*l. c.*, 1894) agree better in all the points mentioned with the specimens before us, and according to their description the margins of the carapace are here only "indistinctement granuleux." All this is in agreement with what we know of the great variability of similar characters among the shallow-water Galatheidæ.

R. I. A. Exp., 1888. 750 fms. (Several spp.)

Distribution.—Bay of Biscay and off the west coast of Spain.

Tribe—**CARIDEA.**

Family—PANDALIDÆ.

Pandalus leptorhynchus, G. O. Sars.

Pandalus leptorhynchus, Kinahan (?) G. O. SARS. Oversigt af Norges Crust. Forh. Vidensk. Selsk. Christiania, 1883, No. 18, p. 47, pl. i., 8–10.

This species is readily distinguished from the other British members of the genus (*P. montagui*, Leach; *P. propinquus*, G. O. Sars; and *P. brevirostis*, Rathke) by the presence of an exognath on the third maxilliped. Its identity with the species so named by Kinahan seems to us more than doubtful, and it is only recorded here under the name applied to it by Sars pending a revision of the allied British forms which we hope to undertake. Though not hitherto recorded as British, there are specimens of *P. leptorhynchus* in the Museum of University College, Dundee, from the Clyde district of Scotland, where it occurs in company with *P. montagui* and *P. propinquus*, the latter being also a hitherto unrecorded member of our fauna.

R. I. A. Exp., 1886. 214 fms.

"Flying Fox" Exp., 1889.

Distribution.—Norway. (G. O. Sars. Ortmann.)

Family—NEMATOCARCINIDÆ.

Nematocarcinus exilis (Sp. Bate).

Stochasmus exilis, SPENCE BATE, Rep. Chall. Macrura, p. 822, pl. cxxxii. 14.

We have referred the specimens before us to the above species, although they do not show the character on which Spence Bate founded, from one imperfect specimen, his "conjectural" genus Stochasmus, namely the presence of a "dactylos" on the third maxilliped. The Irish specimens have these limbs terminated by a strong spine or claw, which may

probably have appeared to Spence Bate as an extra joint. In any case the resemblance in other details to the figures in the "Challenger" Report is so close that we have not hesitated to identify the two forms.

R. I. A. Exp., 1888. 750 fms. (Many spp.)

Distribution.—"Off the Canary Islands" (Spence Bate).

Fam. nov.—BRESILIIDÆ.

Rostrum compressed, serrated. Mandible not deeply notched between its molar and cutting portions, with a palp. Proximal lobe of second maxilla well developed. Second maxilliped with terminal joints not expanded in the characteristic Caridean fashion, seventh joint articulated terminally to sixth. First and second pereiopods chelate, unequal, first stronger than second. Exopods present on certain pereiopods (first and second). Epipods (mastigobranchs) absent from all limbs posterior to second maxillipeds.

Bresilia, gen. nov. With the characters of the family.

Bresilia atlantica, sp. nov.

(Plate I., figs. 1–14; Plate II., figs. 15–18.)

DESCRIPTION.—*General form* rather slender, hardly compressed laterally. *Cephalothorax* rather short relatively to abdomen. Integument thin and moderately flexible, but not quite membranous. Carapace sub-cylindrical; breadth nearly equal to the depth. Rostrum well developed, reaching nearly to the end of the second joint of antennule, compressed, with four teeth above and seven below, the first tooth above situated just behind the orbit. Antennal spine small but distinct, produced backwards for a very short distance as a ridge on the carapace. Antero-lateral corner of carapace with a small tooth. Lower margin obtusely angulated above the base of the first walking legs. Postero-lateral wings of the carapace overlapped by the epimera of the first abdominal segment.

Abdomen about twice the length of cephalothorax. First two segments narrowed above, separated from each other and from the adjacent segments

by membranous interspaces. Third segment prominently gibbous above, but not produced into a tooth behind. Three last segments regularly diminishing in diameter. Last segment cylindrical, about equal in length to the two preceding and to the telson. Epimera of the first three segments large, that of the second segment expanded below and overlapping those of the first and third. Epimera of the fourth and fifth segments produced backwards with rather acute angles.

Eye moderately large but short, not quite reaching half the length of rostrum, devoid of pigment in our spirit specimen. No corneal facets could be detected, and the organ is probably imperfect.

Peduncle of *antennule* (Pl. I., fig. 2) exceeding half the length of the carapace (excluding the rostrum). First joint very large, exceeding by one-half the combined length of the other two joints, furnished on the outer side with the usual spiniform lobe. Second joint twice as long as the third. The outer flagellum is imperfect on both sides of our specimen, but apparently it did not much exceed the length of the peduncle; it tapers rapidly from the rather swollen base, and is furnished with abundance of sensory hairs. The inner flagellum is somewhat shorter than the peduncle.

The *antenna* (Pl. I., fig. 3) has a large basal part indistinctly divided into two, the proximal segment bearing on the lower and inner side a well-developed gland-tubercle, while a spine springs from the inner border of the second segment. The scale is rhomboidal in shape; the outer margin terminates in a strong tooth, and the lamina of the scale, expanding anteriorly, projects further forward to a considerable distance. The total length is twice the breadth of the scale, reaching beyond the peduncle of the antennules. Flagellum probably about as long as carapace, including rostrum, peduncle of three joints.

The *labrum* and *labium* seem to present no noteworthy characters, but could not be adequately studied without doing more injury than the case justified to the single existing specimen.

Mandible (Pl. I., fig. 4) very thin and lamellar; cutting edge and molar process separated by a somewhat shallow notch; palp two-jointed.

First maxilla (Pl. I., fig. 5) with the usual three lobes. Outer lobe or

palp feebly developed, tapering, with a few bristles at the tip. Middle lobe (*lacinia externa* of endognath according to Boas' nomenclature) the longest, curved inwards; the end transversely truncated and armed with a row of short stout dentiform spines. Inner lobe (*lacinia interna*) narrow, with three large and some smaller spines at the tip.

Endognath of *second maxilla* (Pl. I., fig. 6) divided into three lobes, the proximal one of which is simple, pointed, and projecting a little beyond the second. Mesognath or palp slender and tapering, hardly exceeding half the length of the anterior lobe of the exognath. Exognath or scaphognathite well developed; anterior lobe somewhat truncate, posterior rather pointed, the whole fringed with long setæ.

First maxilliped (Pl. I., fig. 7) having the endognath divided into two lobes of which the distal is the larger, and alone carries setæ. Mesognath a narrow tapering lobe with a few bristles towards the tip. Exognath rather narrow, tapering regularly to the tip, without flagellum and without the external lobe marked on Boas' figures, and said by him to be characteristic of the Eukyphota ["scapus exognathi processu exteriore magno." Dekap. Slaegtskabsforhold, p. 134.] Epignath (epipod) possessing a well-developed distal (or anterior), as well as a proximal (or posterior) lobe.

The *second maxilliped* (Pl. I., fig. 8) is very remarkable. It differs greatly from the typical Caridean form in having none of the joints expanded and lamellar, while the last joint is articulated to the distal end of the preceding, instead of to its inwardly directed (but really outer) edge, as is usually the case. There are six well-marked joints, with indications of a division of the second joint into two. The first joint bears a membranous epignath (epipod), while the second joint carries an unsegmented exognath (exopod or palp) extending as far as the fourth joint. Besides setæ on the inwardly directed edges of all the joints, the last joint of the limb bears a series of about ten strong, curved, serrated spines.

The *third maxilliped* (Pl. I., fig. 9) is long, slender, and five-jointed, reaching to the tip of the antennal scale. The first two joints are very short, the third very long, slightly sinuous, and equal in length to the fourth and fifth together; the fifth is about one-half longer than the fourth.

All the joints are sparingly beset with bristles. Exognath (exopod) slightly exceeding the third joint, apparently unjointed, tipped with setæ. A small rounded eminence on the outer side of the first joint probably represents the almost vanished epipod.

The first *thoracic leg* (Pl. I., fig. 10) is slightly shorter, but much more strongly built, than the second, which is very slender. The three following are long and slender, successively increasing somewhat in length. Exopods are present on the first two. Epipods are wanting throughout. In the first leg the exopod reaches to the middle of the fourth joint, and the fifth joint is nearly level with the end of the rostrum when the limb is extended forwards; the fifth joint (carpus) is very short and thick, about one-sixth the length of the chela, and as broad as long. The chela is very powerful, nearly three-fourths the length of the rest of the limb, somewhat curved, the fingers at least equal in length to the palm, which is rather more than twice as long as broad. The fingers are robust, and closely toothed along the opposed edges.

The second leg (Pl. I., fig. 11) is very slender compared with the preceding, but somewhat stouter than the following limbs, and is of nearly uniform thickness throughout. The exopod reaches a little beyond the third joint. The fourth joint (merus) is rather longer than in the preceding limb, being nearly twice as long as the third joint (ischium), and equalling the chela. The fifth joint (carpus) is rather less than half as long as the chela. The chela is remarkably slender, being of similar diameter to the rest of the limb, evenly curved, the fingers occupying about half its length. The fingers are toothed on their inner edges, and tipped with minute tufts of setæ (Pl. I., fig. 11*a*), which we may be permitted to compare with the mud-collecting brushes on the strangely modified chelæ of the Atyidæ.

The remaining legs (Pl. I., figs. 12–13) are slender, the fourth and sixth joints being longest. The last leg is the longest, the difference being mainly in the fifth joint. The claw is long and slender, and is opposed to a brush of stiff setæ springing near its base.

The genital openings could not be detected.

Between the bases of the second, third, and fourth pairs of legs are

placed paired appendages springing from the sternal surface of the thorax (Pl. I., fig. 14). These are in the form of thin triangular plates, with their apices directed forwards, and approaching each other closely in the middle line, the opposed edges of each pair being parallel.

The first pair of *swimmerets* (Pl. II., fig. 15) have the inner lobe very small, simple, pointed, and curved inwards. The second to the fifth pairs (Pl. II., fig. 16) are of the normal type of the Caridea, and bear the usual "appendix interna" on the endopod. The sixth pair (Pl. II., fig. 17) have the inner plate lanceolate, and slightly shorter than the outer, which is obliquely rounded at the tip, and has the straight outer edge terminating in a distinct tooth.

The *telson* (Pl. II., fig. 17) is rather shorter than the inner plates of the tail-fan. Its sides are parallel for one-third of its length from the base, then it narrows down to the roundly truncated tip, which is less than half the width of the base, and carries a series of thirteen spines, longest at the corners and shortest in the middle. The sides of the telson each bear about seven small denticles.

The *branchial system* (Pl. II., fig. 18) is remarkable for its great reduction. As already mentioned, no epipods are present on any of the thoracic feet, but only on the first and second maxillipeds. No arthrobranchiæ could be detected. Four pleurobranchs are present over the bases of the first four walking legs, and a fifth is represented by a papilla over the base of fifth leg. The four pleurobranchiæ increase in size from before backwards, and have the usual phyllobranchiate structure.*

Length 29 mm.

R.I.A. Exp. 1888, 750 fms. (1 sp.).

Affinities and systematic position.—The remarkable features of this new form, which have led us to found a new family for its reception, give it a

* As the single specimen was dissected on one side only, it is possible that there may be some errors in the account of the branchial system. It is believed, however, that the arrangement is substantially as described above.

somewhat isolated position among the Caridea. The following points indicate its primitive character:—

1. Mandible not deeply divided, and possessed of a palp.
2. Proximal lobe of second maxilla not reduced.
3. Second maxilliped, with its terminal joints not expanded nor distorted as in the typical Caridea.
4. Exopods present on certain thoracic feet.

In regard to the first character, the possession of a palp is a feature which may be absent or present within the limits of one or other of many families. The notch between the cutting edge and the molar process of the mandible, though small compared with the condition found in such higher Caridea as Hippolyte and Palæmon, is still very marked when compared with the Acanthephyridæ or Atyidæ.

The large size of the proximal lobe of the endognath of the second maxilla is an interesting feature. This lobe is large in the Atyidæ, but, as a rule, it is conspicuously small throughout the Caridea, even in the very primitive Acanthephyridæ. Even in Sergestes, according to Boas' figures, it is not so prominent as in our genus.

The third character of those enumerated is perhaps the most striking and the most distinctively different from the normal Caridean type. It is paralleled in the Pasiphæidæ alone of the Caridea, which family, however, is widely different in all the characters of its mouth-parts from Bresilia.

As regards the presence of exopods on certain thoracic legs, the only families of Caridea in which they occur are the Acanthephyridæ, the Pasiphæidæ, and the lower Atyidæ. In the first two of these families exopods are normally present on all the thoracic limbs, though they are absent, according to Faxon's figure, from the last two legs of *Acanthephyra cristata*, Faxon (Stalk-eyed Crust. of "Albatross" Exp., pl. xliii.) a circumstance of which the author takes no note in his description. In the lower Atyidæ they are present on all the thoracic legs, a feature entitling the separation of these forms in Faxon's opinion as a sub-family Paratyinæ. In the higher Atyidæ they are wanting, but in a transitional form Atyephyra, Brito

Capello (Hemicaridina, Ortmann) they exist only on the first two pairs of legs, exactly as in our genus.

While the general weight of evidence drawn from the foregoing characters is in favour of ascribing a somewhat low and primitive place to Bresilia, yet, on the other hand, the great reduction of the branchial system, and still more strikingly the absence of epipods from all limbs posterior to the second maxillipeds, indicate a considerable degree of specialization as regards these portions of the organism such as is reached, for example, by some Hippolytidæ and Palæmonidæ.

In searching for yet other indications of the animal's probable affinities, we may note the resemblance between the paired processes of the thoracic sterna and the corresponding structures in Campylonotus, as figured by Spence Bate (Chall. Rep. Macrura, pl. cxxii.). Similar processes, though less developed, are found in several species of Hippolytidæ, where they are larger in the male than in the female (Kröyer, Monogr. Hipp., K. Dansk Selsk. Naturvid. Afhandlg., ix., p. 233, 1842). It is probable that such processes are of not uncommon occurrence among the Caridea, and are not to be taken as pointing to any close affinity between our genus and Campylonotus, which latter, moreover, is now a homeless genus, since Ortmann has excluded it from the Acanthephyridæ.

The considerable resemblance to Caridion in general aspect, and especially in the relations of the first two legs, is probably not indicative of any very close affinity. The mouth-parts of Caridion show none of the primitive characters mentioned above, and its branchial system is very different. In any case, here again any such resemblance as may exist would not help us far, for Caridion is a genus as to whose systematic place there is considerable doubt.

It would be improper to omit a passing mention of the possibility that our single specimen may be immature, and may owe to immaturity such apparently primitive characters as those presented by the maxillæ and maxillipeds. This, however, is no more than a faint possibility to which the other characters of the animal give little support.

Taking it for granted accordingly, in the meantime, that we are dealing with an adult Crustacean, it is plain that the diagnosis of no existing family

provides for its reception. As regards the position in the system of the new family to which we relegate it, it is at least so far plain that the Bresiliidæ must find a place low down among the Caridea, not far remote from the Acanthephyridæ and Atyidæ, and the hypothetical stock of the more highly specialized Pasiphæidæ.

Tribe—**PENÆIDEA.**

Family—PENÆIDÆ.

Solenocera siphonocerus (Philippi).

Penæus membranaceus, .	H. MILNE-EDWARDS, Hist. Nat. des Crust. II. p. 417, 1837 (*nec* Risso).
,, *siphonocerus*, .	PHILIPPI, Arch. f. Naturg., 1840, p. 190, pl. iv. 3.
,, ,, .	GOURRET, Ann. Mus. Marseille. III., Mém. 5, p. 177, pl. xvi., xvii., 1888.
Solenocera Philippi, .	LUCAS, Ann. de la Soc. Entom. Fr. (2) VIII., p. 215, pl. vii. 2, 1850.
,, *siphonocera*, .	MIERS, Proc. Zool. Soc., 1878, p. 301.

R. I. A. Exp., 1886. 325 fms. (1 sp.).
,, ,, 1888. 345 ,, (1 sp.).

DISTRIBUTION.—Out of the Mediterranean, this species has only been recorded from "Gulf of Paria, Venezuela" (Smith, Proc. U. S. Nat. Mus. VIII., p. 86, 1885).

Family—SERGESTIDÆ.

Sergestes, sp.

(?) *Sergestes profundus*, . SPENCE BATE, Chall. Rep. Macrura, p. 428.

A single much-mutilated specimen of a species of Sergestes, which we have not been able to determine with certainty, is said to have come from the great depth of 1020 fathoms. The presence in the same bottle of a specimen of the characteristic deep-sea schizopod *Eucopia australis*, Dana, helps the probability that the animals really came from the depth indicated on the label, though Eucopia is now known to occur at times at less depths or

even in the surface fauna (Faxon, Stalk-eyed Crustacea, "Albatross," p. 249). So far as we know the only Sergestes recorded from a depth comparable to this is *S. profundus*, Spence Bate, from 2550 fms. in the South Atlantic and 1375 fathoms in the Pacific, a species which Ortmann in his synopsis of the genus (Decap. u. Schiz. d. Plankton Exped., p. 32, 1893) only recognizes as dubious. The few details given by Spence Bate (who does not figure his species) do not enable us to decide as to the identity of the two forms, but they are evidently closely allied, the only point of difference which can be gleaned from his meagre description being that the eyes in *S. profundus* are said to be one-fourth of the length of the carapace, while in the present form the relative length is nearly one-half. Referring the characters of our specimen to those tabulated in Ortmann's synopsis, we note in the first place the presence of a denticle on the outer border of the exopodite of the uropod (a portion of the body missing in Spence Bate's specimens). The short rostrum, provided above with a tooth, and the eyes shorter, but not much shorter than the basal joint of the antennule, and the fact that the optic peduncle swells gradually without intermediate constriction into the cornea, bring our species into close relation with Stimpson's *S. longicaudatus* from the Pacific, and mark it off as at any rate different from any other known species from the Atlantic area.

Length 14 mm.

R. I. A. Exp., 1888. 1020 fms. (1 sp.).

Sub-Order—SCHIZOPODA.

Family—EUCOPIIDÆ.

Eucopia australis, Dana.

Eucopia australis, DANA, . . U. S. Exploring Exp., Crust., pt. I., p. 609, pl. xi., 10.
" " " SARS, Chall. Rep., Schizopoda, p. 55, pls. ix., x.
Chalaraspis unguiculata, SUHM, Trans. Linn. Soc. Zool. (2), I., p. 37, pl. viii.

The occurrence within the region under consideration of this characteristic deep-sea Schizopod is in harmony with what we know of its immense

and cosmopolitan distribution. Sars quotes from Suhm to the effect that, on the "Challenger" Expedition, this species occurred in almost every haul of the dredge from the deep waters of the Atlantic, while it was also taken at many stations in the Pacific, Indian, and Antarctic Oceans. The specimen described by Dana was taken from the stomach of a penguin in the Antarctic Ocean. Faxon (Crust., "Albatross," 1895, p. 249) gives evidence to show that this species sometimes occurs at or near the surface; but its complete absence from the collections of the Plankton Expedition (Ortmann, *op. cit.*, p. 21) shows that its occurrence there must be regarded as exceptional.

R.I.A. Exp., 1888, 1020 fms. (1 sp.).

Family—EUPHAUSIIDÆ.

Nematodactylus, gen. nov.

Mandible with three-jointed palp. First maxilla without exognath. Second leg greatly elongated, merus peculiarly bent at proximal end; dactylus elongated, and armed at the tip with very long serrated spines. Sixth leg short, seven-jointed. Last leg rudimentary.

This new genus will include, besides the form described below, the doubtless congeneric, but apparently distinct, species described by Ortmann (Dec. & Schiz. d. Plankton Exp., p. 18, pl. i., fig. 7) as *Stylocheiron flexipes.* The distinctive characters of the two species may be shortly summarized as follows:—

Nematodactylus flexipes (Ortmann). Abdomen dorsally toothed on third, fourth, fifth, and sixth segments. Carapace with a pair of lateral denticles. Rostrum acute, reaching beyond eyes. Eyes constricted across the middle.

South Atlantic, 400–500 metres depth (Ortmann, *l.c.*); Pacific, Gulf of Panama, and between Cape San Francisco and Galapagos (Ortmann, Bull. Mus. Comp. Zool., xxv., p. 105).

Nematodactylus boöpis, n. sp. Abdomen not dorsally toothed. Carapace without lateral denticles. Rostrum very short, obtuse, not reaching beyond eyes. Eyes very large, globular.

Off S.-W. Ireland, 1020 fms. depth.

Nematodactylus boöpis, n. sp.

(Plate II., figs. 19–28.)

DESCRIPTION.—*Carapace* less than half the length of abdomen, without lateral denticles, lower margins slightly sinuous. On the dorsal surface a well-marked keel begins about the middle, and runs forward into a very short, obtuse, rostral projection; antero-lateral corners produced forwards, and obliquely truncated. *Abdominal segments* diminishing in depth posteriorly, the sixth the longest and somewhat compressed, having a simple, curved preanal spine ventrally. Epimera of first five segments acutely rounded below. No teeth on dorsal surface.

Eyes very large, globose, not exhibiting the division into two parts by a transverse constriction conspicuous in Thysanoëssa, Nematoscelis, and Stylocheiron, and in the allied species *Nematodactylus flexipes* (*Stylocheiron flexipes* of Ortmann); pigment black.

Peduncle of *antennules* rather stout, second and third joints hardly longer than broad, and together less than the first joint.

Antennal scale (Pl. II., fig. 20) very short, not reaching to end of second joint of antennular peduncle; four times as long as broad; outer margin convex basally, concave distally, terminating in a minute tooth; apex squarely truncate. Basal spine short and curved. Peduncle of flagellum half as wide as the scale, and three-fourths as long, its three joints about equal in length.

Labrum and *Labium* exactly as in Nematoscelis.

Mandibles (Pl. II., fig. 21) as in Nematoscelis, the palp rather slender, last joint one-half the length of the preceding.

The *first maxilla* (Pl. II., fig. 22) resembles that of Stylocheiron in being destitute of exognath. It differs, however, in the shape of the terminal joint or palp, which is very narrow, and not expanded, as in most Euphausiidæ.

The *second maxilla* (Pl. II., fig. 23) resembles that of Nematoscelis. The proximal lobe, however, is small and pointed, and the exognath is much reduced.

Maxilliped (Pl. II., fig. 24) (according to Sars' terminology, but hardly deserving, in the Euphausiidæ, of a separate designation from the other

thoracic limbs) well developed, resembling that of Nematoscelis. The proximal joints, however, are not quite so much expanded as in that genus; the merus (fourth joint) is more than half as long again as the ischium (third joint), while the last three joints are slender and elongated. The exopod reaches to about the middle of the merus.

First thoracic leg (Pl. II., fig. 25) (or second if the so-called maxilliped be allowed to rank as the first) differing from that in both the allied genera. In Nematoscelis, this leg is immensely elongated, and armed at the tip with a tuft of peculiar spines. In Stylocheiron, it is said by Sars (who, however, does not figure the limb in any of his described species) to resemble the maxilliped, being only a trifle more elongate. In the present genus, while resembling the maxilliped in general shape and size, it differs from that appendage in the peculiar armature of the dactylus (Pl. II., fig. 25 *a*). This joint is lanceolate in shape, and bears on its lower edge, near the tip, a number of long feathered bristles. From a hollow on its lower and inner side springs a row of eight short, stout, curved spines, gradually increasing in size distally. Although such an arrangement has not been recognized in the closely allied Stylocheiron,* yet it is known to be present in the corresponding limb of the less specialized Euphausiidæ, such as Euphausia, Thysanopoda, Boreophausia, and Nyctiphanes.

The *second thoracic leg* (Pl. II., fig. 26) is exceedingly long and slender, and, while resembling in this respect the corresponding limb in Stylocheiron, it differs from the corresponding limb in Nematoscelis, but resembles closely in length and general conformation the *first* leg in the latter genus. The ischial joint is stout, twice as broad as, and slightly shorter than, the merus. The latter is abruptly bent upwards at a little distance from its base; below the bend its upper edge is produced into a flat plate, which apparently strengthens the articulation with the preceding joint. The carpus is somewhat longer and still more slender than the merus, but slightly expanding distally. The propodus is three-fourths the length of the carpus, and of like thickness. None of the preceding joints are

* In *Stylocheiron mastigophorum*, according to Chun, the dactylus bears only "vier Klauenförmige Borsten." (Chun, Atlantis; Biol. Stud. über Pelagische Organismen. V., Biblioth. Zool., 19 Hft. 3 Lfg. 1896).

furnished with spines or setæ. The dactylus is remarkably long, being two-thirds the length of the propodus, and furnished at the tip with about six long, stout, serrated spines (Pl. II., fig. 26 *a*), exactly similar to those on the *first* leg of Nematoscelis. Four of these spines spring from the truncated end of the joint, while two are articulated a little way down on the lower side. All the spines lie parallel to the axis of the joint. The limb is sharply bent between the meral and carpal joints. The exopod is of the usual form, and reaches beyond the middle of the ischium.

The four succeeding thoracic legs present no noteworthy differences from those of Nematoscelis.

The *sixth leg* (Pl. II., fig. 27) is short, but presents the full number of joints, thus differing from the corresponding limb in all the genera of Euphausiidæ save Thysanopoda and Bentheuphausia. The last thoracic leg is represented by a small lanceolate leaflet which resembles in shape that of Stylocheiron.

The *branchiæ* are very imperfectly preserved in the unique specimen at our disposal, and we are therefore unable to give a complete account of their arrangement. They are certainly, however, much more fully developed than in Stylocheiron, the last five pairs at any rate being two-branched as in Nematoscelis.

The *luminous organs* present the typical Euphausid arrangement, there being two pairs on the thorax at the bases of the first and sixth pairs of legs, and an unpaired series on the sternal surface of the abdomen, one between the bases of each pair of swimmerets, from the first to the fourth. In Stylocheiron only the posterior thoracic pair and the first abdominal organ are present.

The *swimmerets* are of the usual structure, and none are modified as sexual organs, our specimen being apparently a female.

The *telson* (Pl. II., fig. 28) is about equal to the two preceding segments together, and somewhat longer than the uropods. It is obtusely pointed, and the sub-apical spines are long and smooth. The outer plate of the uropod is slightly longer than the inner.

Length 22 mm.

R. I. A. Exp., 1888. 1020 fms. (1 sp.).

As will be seen from the above description this species presents a curious mingling of features which, separately, are characteristic of the two genera Nematoscelis and Stylocheiron, together with a few which it shares in common with the more primitive genera of Euphausiidæ, such as Euphausia. While resembling Nematoscelis in most of its characters, it is sharply distinguished from that genus by the fact that the second instead of the first pair of legs are elongated, while the shape and armature of these two different pairs of appendages, namely the first in Nematoscelis and the second in Nematodactylus, show great similarity in the two animals. To Stylocheiron our genus is allied by the elongation of the second legs and the absence of an exognath on the first maxilla, but it differs in the presence of a mandibular palp, and in possessing a full complement of luminous organs, as well as in the armature of the second legs, and in other points. Primitive characters, on the other hand, are found (1) in the armature above described on the last joint of the first legs, which resembles precisely that of Euphausia, Boreophausia, Nyctiphanes, &c., but differs from that of Stylocheiron not less than from that of Nematoscelis; (2) in the full development of the penultimate thoracic legs, which here present the full number of joints, a condition which among the Euphausiidæ is found only in Thysanopoda and Bentheuphausia.

The chief points of comparison with the two allied genera may be thus tabulated:—

Nematoscelis.	Nematodactylus.	Stylocheiron.
First legs greatly elongated, and armed at tip with long, serrated spines.	First legs not greatly elongated. Last joint armed with short, hooked spines.	First legs not greatly elongated. Last joint without hooked spines.
Second legs not elongated, similar to succeeding pair.	Second legs greatly elongated, and armed at tip with long, serrated spines.	Second legs greatly elongated, with chela-like spine armature.
Mandibles with palp.	Mandibles with palp.	Mandibles without palp.
First maxillæ with exognath.	First maxillæ without exognath.	First maxillæ without exognath.
Luminous organs, two pairs thoracic, and four single abdominal.	Luminous organs, two pairs thoracic, and four single abdominal.	Luminous organs, one pair thoracic, and one single abdominal.

W.T.C. del.

West, Newman lith.

DESCRIPTION OF THE PLATES.

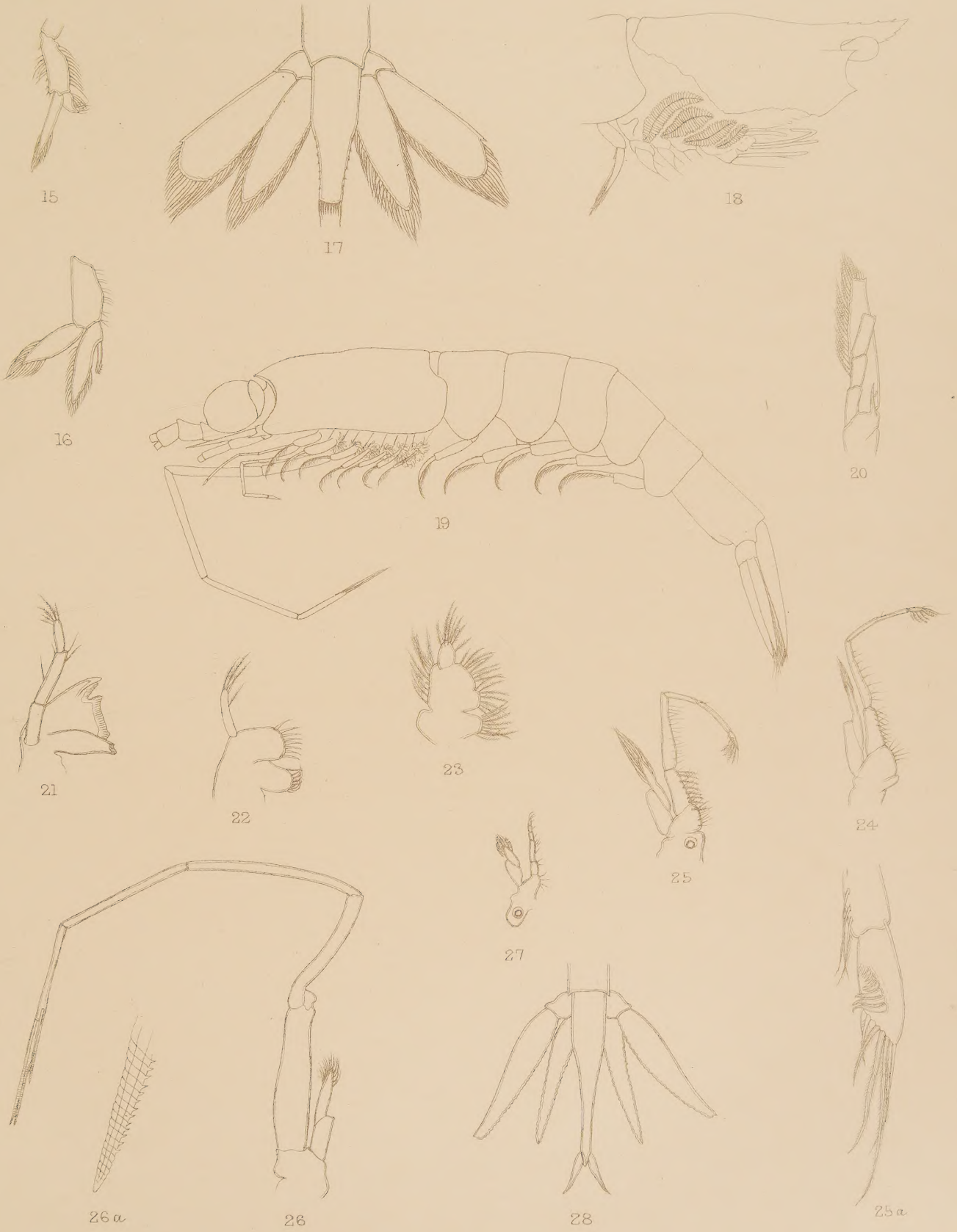
PLATE I.

Figure.

1. *Bresilia atlantica*, n. g. and sp., lateral view, enlarged.
2. ,, ,, ,, antennule.
3. ,, ,, ,, antenna.
4. ,, ,, ,, mandible.
5. ,, ,, ,, first maxilla.
6. ,, ,, ,, second maxilla.
7. ,, ,, ,, first maxilliped.
8. ,, ,, ,, second maxilliped.
9. ,, ,, ,, third maxilliped.
10. ,, ,, ,, first thoracic leg.
11. ,, ,, ,, second thoracic leg.
11*a*. ,, ,, ,, second thoracic leg, tip of chela further enlarged.
12. ,, ,, ,, third thoracic leg.
13. ,, ,, ,, fifth thoracic leg.
14. ,, ,, ,, ventral surface of thorax, showing sternal processes.

PLATE II.

Figure		
15.	*Bresilia atlantica*, n. g. and sp.,	first swimmeret.
16.	,, ,, ,,	second swimmeret.
17.	,, ,, ,,	uropods and telson.
18.	,, ,, ,,	gills.
19.	*Nematodactylus boöpis*, n. g. and sp.,	lateral view, enlarged.
20.	,, ,, ,,	antenna.
21.	,, ,, ,,	mandible.
22.	,, ,, ,,	first maxilla.
23.	,, ,, ,,	second maxilla.
24.	,, ,, ,,	maxilliped.
25.	,, ,, ,,	first thoracic leg.
25*a*.	,, ,, ,,	first thoracic leg, tip further enlarged.
26.	,, ,, ,,	second thoracic leg.
26*a*.	,, ,, ,,	second thoracic leg, tip of one of the terminal spines further enlarged.
27.	,, ,, ,,	penultimate leg.
28.	,, ,, ,,	tail-fan.



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